AFRL-RH-WP-TP-2014-0046

PREDICTIVE VALIDITY OF THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY FOR SEVERAL US AIR FORCE ENLISTED TRAINING SPECIALTIES

Thomas R. Carretta
Air Force Research Laboratory
Wright-Patterson AFB, OH

December 2014
Interim Report

STINFO COPY

AIR FORCE RESEARCH LABORATORY
711 HUMAN PERFORMANCE WING,
HUMAN EFFECTIVENESS DIRECTORATE,
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433
AIR FORCE MATERIEL COMMAND
UNITED STATES AIR FORCE

NOTICE AND SIGNATURE PAGE

AFRL-RH-WP-TP-2014-0046 HAS BEEN REVIEWED AND IS APPROVED FOR PUBLICATION IN ACCORDANCE WITH ASSIGNED DISTRIBUTION STATEMENT.

//signed//
Thomas R. Carretta
Engineering Research Psychologist
Systems Control Interface Branch
Decision Making Division

//signed//
Gregory J. Barbato
Chief, Systems Control Interface Branch
Decision Making Division

//signed//
William E. Russell
Chief, Decision Making Division
Human Effectiveness Directorate
711 Human Performance Wing

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
30-12-2014	Interim	01 Apr 2014 – 30 Nov 2014

4. TITLE AND SUBTITLE

Predictive Validity of the Armed Services Vocational Aptitude Battery for Several US Air Force Enlisted Training Specialties

5a. CONTRACT NUMBER
FA8650-11-C-6158

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER
62202F

6. AUTHOR(S)

Thomas R. Carretta

5d. PROJECT NUMBER
5329

5e. TASK NUMBER
09

5f. WORK UNIT NUMBER
H03K/53290902

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AND ADDRESS(ES)
See next page.

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Air Force Materiel Command
Air Force Research Laboratory
711 Human Performance Wing
Human Effectiveness Directorate
Warfighter Interface Division
Supervisory Control and Cognition Branch
Wright-Patterson AFB OH 45433

10. SPONSOR/MONITOR'S ACRONYM(S)
711 HPW/RHCI

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
AFRL-WP-RH-TP-2014-0046

12. DISTRIBUTION / AVAILABILITY STATEMENT
Distribution A: Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES
88 ABW Cleared 12/22/2014; 88ABW-2014-6037.

14. ABSTRACT

The Armed Services Vocational Aptitude Battery (ASVAB) is used by all branches of the US Military for enlistment qualification and to assign qualified applicants to training specialties. The primary purpose of the current study was to examine the predictive validity of the US Air Force classification composites and the Armed Forces Qualification Test versus initial training performance. A secondary purpose was to determine whether switching from the current classification composite to another would improve prediction of training performance. The sample consisted of 117,232 enlisted personnel who attended training between 2006-2013. Data were available for 111 Air Force Specialties. High levels of predictive validity were observed for most training specialties. After correction for range restriction, the mean correlation between the current classification composite and training performance was .70, weighted by course sample size. (cont).

15. SUBJECT TERMS
Armed Services Vocational Aptitude Battery, ASVAB, predictive validity

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Antonio Ayala
Unclassified	Unclassified	Unclassified	SAR	18	**19b. TELEPHONE NUMBER** *(include area code)*

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

7. Performing Organization Names and Addresses

Air Force Materiel Command
Air Force Research Laboratory
711 Human Performance Wing
Human Effectiveness Directorate
Warfighter Interface Division
Supervisory Control and Cognition Branch
Wright-Patterson AFB OH 45433-7511

14. Abstract

Several instances were identified where the current classification composite for a training specialty was not the one with the highest predictive validity for that specialty. Additional analyses of training content and qualification rates for sex and racial/ethnic groups for the current and alternate composite are needed to determine whether switching from the current composite to another is warranted.

TABLE OF CONTENTS

LIST OF TABLES

PREFACE

This report describes activities performed during the examination of historical data regarding measures of US Air Force enlisted personnel aptitude and training outcomes (711 HPW/RHCI), Work Unit 53290902. The data were provided by the Air Force Personnel Center, Strategic Research and Assessment Branch (AFPC/DSYX) at Randolph AFB, TX. The opinions expressed are those of the author and not necessarily those of the United States Government, Department of Defense, or the United States Air Force.

PREDICTIVE VALIDITY OF THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY FOR SEVERAL US AIR FORCE ENLISTED TRAINING SPECIALTIES

1.0 SUMMARY

The Armed Services Vocational Aptitude Battery (ASVAB) is used by all branches of the US Military for enlistment qualification and to assign qualified applicants to training specialties. The purpose of the current study was to examine the predictive validity of US Air Force ASVAB aptitude composites for 111 training specialties. High levels of predictive validity were observed for most training specialties. After correction for range restriction, the mean correlation between the current classification composite and training performance was .70, weighted by course sample size. Several instances were identified where the current classification composite for a training specialty was not the one with the highest predictive validity for that specialty. Additional analyses of training content and qualification rates for women and racial/ethnic minorities are needed to determine whether switching from the current classification composite to another is warranted.

2.0 INTRODUCTION

The Armed Services Vocational Aptitude Battery (Segall, 2004) is used by all of the US military services for enlistment qualification and to classify enlistees into occupations. Several studies have demonstrated the predictive validity of the ASVAB for US Air Force (USAF) enlisted training performance (Earles & Ree, 1992; Ree, Carretta, & Doub, 1998/1999; Ree & Earles, 1991; Welsh, Kucinkas, & Curran, 1990) and job performance (Ree & Earles, 1992, 1993; Ree, Earles, & Teachout, 1994). Despite the proven relations of the ASVAB to training and job performance, it is important to occasionally evaluate its predictive validity as changes occur to the ASVAB and to military training. For example, over the last decade the proportion of ASVAB tests administered via paper-and-pencil has declined and the proportion of computer adaptive testing has increased. Also during that period some training specialties have merged, others have seen changes to content, and new specialties have emerged (e.g., cyber, remotely piloted aircraft sensor operator).

The primary purpose of this study was to examine the predictive validity of the USAF ASVAB classification composites and the Armed Forces Qualification Test (AFQT[1]) versus initial training performance. A secondary purpose was to determine whether switching from the current classification composite to another would improve prediction.

[1] The AFQT is used by all branches of the US Military to qualify applicants for enlistment. AFQT = AR + MK + 2*VE, where AR is Arithmetic Reasoning, MK is Math Knowledge, and VE (Verbal Expression) is a weighted composite of the two verbal tests, Paragraph Comprehension (PC) and Word Knowledge.

3.0 METHODS

3.1 Participants

Participants were 117,232 USAF enlisted personnel who attended training between 2006 and 2013. Data were available for 111 Air Force Specialties (AFSs). Sample sizes ranged from 88 (1N332 – Cryptologic Linguist – Spanish) to 19,261 (3P031 - Security Forces) with a mean and median sample size of 1,056 and 487.

3.2 Measures

3.2.1 **Armed Services Vocational Aptitude Battery.** The ASVAB has 9 subtests that are combined into composites for enlistment qualification and classification into training specialties. Brief descriptions of the subtests are provided in Table 1. As previously discussed, the AFQT, a composite of the verbal and math subtests, is used by all US military services for enlistment qualification. Each Service also uses several composites to classify applicants into training specialties. The US Air force uses 4 classification composites, known as MAGE[2] - Mechanical (M), Administrative (A), General (G), and Electronics (E). Both the AFQT and the USAF MAGE composites are reported as percentile scores that range from 1 to 99.

Table 1

Description of the ASVAB Subtests

Subtest Name and Abbreviation	Subtest Description
General Science (GS)	Knowledge of physical and biological sciences
Arithmetic Reasoning (AR)	Ability to solve arithmetic word problems
Word Knowledge (WK)	Ability to select the correct meaning of words presented in context and correct synonyms
Paragraph Comprehension (PC)	Ability to obtain information from written passages
Mathematics Knowledge (MK)	Knowledge of high school mathematics principles
Electronics Information (EI)	Knowledge of electricity and electronics
Auto and Shop Information (AS)	Knowledge of automobile and shop technologies tools and practices
Mechanical Comprehension (MC)	Knowledge of mechanical and physical principles
Assembling Objects (AO)	Ability to determine correct spatial forms from their separate parts and connection points

[2] Mechanical (M) = AR + MC + AS + 2*VE; Administrative (A) = MK + VE; General (G) = AR + VE; and Electronics (E) = GS + AR + MK + EI.

3.2.2 **Training Performance.** Grades on written tests were available for 108 of the 111 training specialties. For AFSs where grades were available, final school grade was the numerical average of the written test grades. For the other 3 courses (3N032 - Broadcast Journalist, 3E031 – Public Health, and 4M031 – Aerospace Physiology), only a dichotomous pass/fail training score was available.

3.3 Analyses

Analyses were conducted by AFS. The correlations of the ASVAB subtests and training criterion were computed separately for each AFS. The observed correlations were corrected for range restriction using the multivariate method (Lawley, 1943) to provide an estimate of predictive validity in the unrestricted (applicant) population. For the three courses with pass/fail training outcomes, the observed correlations were corrected for range restriction and dichotomization of the criterion (Cohen, 1983). The corrected correlations were examined to determine which composite (AFQT, Mechanical, Administrative, General, or Electronic) provided the highest predictive validity for each AFS.

The assumptions underlying range restriction correction are the same as two of the three assumptions underlying the computation of a Pearson product-moment correlation - linearity of form and homoscedasticity. If the assumptions are met to estimate the correlation coefficient, they also are met to compute the correction. Restriction of range generally causes statistical indexes to underestimate true values.

4.0 RESULTS AND DISCUSSION

Table A-1 provides the corrected correlation by AFS. The average correlation between the operational MAGE composite for each AFS and training performance weighted by sample size was .70. Cohen (1988) characterizes correlations of .10 or l0wer as small, .30 as medium, and .50 or greater as large. Only one of the correlations for operational composites (1N332 – Cryptologic Linguist – Spanish) was in the low range, 16 were moderate, and 94 were large. The validities for 1N332 were negative. The reason for this is unknown, However, it was speculated that this may be due to trainees with low ASVAB scores but prior Spanish experience outperformed those with higher ASVAB scores, but no prior Spanish language experience.

An examination of the validities by training specialty revealed that in many cases the operational composite did not have the highest validity. See Tables 2 and A-1. As shown in Table 3, all of the AFSs that would benefit most from a change in composite involved replacing the General composite with another, Additional studies are needed to determine whether these results are related to training requirements. For example, for Bioenvironmental Engineer is the higher validity for E (.443) compared with the current composite, G (.385) due to changes in job requirement with a greater emphasis on electronics knowledge?

Table 2

Differences in Validities of Operational Composites versus Alternate Composites

Result	N
Current Composite Best	38
Different Composite Better (.001 - .019)	38
Different Composite Better (.020 - .039)	22
Different Composite Better (.040+)	13

Table 3

Training Specialties that would Benefit Most from a Change in Composite

Air Force Specialty	Current	New	R Change
1N231 – Signals Int. Analyst	G (.656)	AFQT (.702)	.046
1N330 – Cryptologic Linguist	G (.416)	A (.485)	.069
1N335 – Cryptologic Linguist	G (.462)	A (.502)	.040
1U0x1 – Sensor operator	G (.499)	M (.539)	.040
3N032 – Broadcast Journalist	G (.668)	M (.721)	.053
3S231 – Education & training	G (.370)	A (.412)	.042
4B031 – Bioenvironmental Engineer	G (.385)	E (.443)	.058
4C031 – Mental Health Services	G (.712)	A (.764)	.052
4E031 – Public Health	G (.420)	AFQT (.495)	.075
4J032 – Physical Medicine	G (.621)	A (.669)	.048
4M031 – Aerospace Physiology	G (.153)	A (.316)	.163
4V031 - Optometry	G (.436)	A (.502)	.066
4Y032 – Dental Laboratory	G (.511)	E (.579)	.068

In addition to predictive validity, another concern is adverse impact of the qualification composites (MAGE). The largest amount of adverse impact occurs for the technical knowledge

subtests (Auto/Shop, Electronics Information, and Mechanical Comprehension) and the Electronics and Mechanical composites. Examination of the validities in Table A-1 shows that there are several AFSs where changing from an operational composite of M or E to another with no technical knowledge content (A, G, or AFQT) would result in little decrease in predictive validity (e.g., 1P031, 2A332) or in some instances in a slight improvement in predictive validity (e.g., 2A031, 2A331).

5.0 CONCLUSIONS AND RECOMMENDATIONS

In general, the current US Air Force classification composites demonstrated good predictive validity for training performance. The weighted average corrected validity was .70 across all training specialties. Despite this result, there were several instances where validity could be improved by switching from the current operational composite to another. Further, there were several instances where adverse impact could be reduced by switching from either the current Electronics or Mechanical composite to another with little or no loss of predictive validity. For training specialties that would potentially benefit from a change in qualification composite, additional studies are recommended to examine current job requirements.

6.0 REFERENCES

Cohen, J. (1983). The cost of dichotomization. *Applied Psychological Measurement, 7*, 249-253.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.)*. Mahwah, NJ: Erlbaum.

Earles, J. A., & Ree, M. J. (1992). Training validity. *Educational and Psychological Measurement, 54,* 721-725.

Lawley, D. N. (1943). A note on Karl Pearson's selection formulae. *Proceedings of the Royal Society of Edinburgh,* LXII-Part 1, 19-32.

Ree, M. J., Carretta, T. R., Doub, T. W. (1998/1999). A test of three models of the role of *g* and prior job knowledge in the acquisition of subsequent job knowledge in training. *Training Research Journal, 4,* 135-150.

Ree, M. J., & Earles, J. A. (1991). Predicting training success: Not much more than *g*. *Personnel Psychology, 44,* 321-332.

Ree, M. J., & Earles, J. A. (1992). Intelligence is the best predictor of job performance. *Current Directions in Psychological Science, 1,* 86-89.

Ree, M. J., & Earles, J. A. (1993). *g* is to psychology what carbon is to chemistry: A reply to Sternberg and Wagner, and McClelland and Calfee. *Psychological Science, 2,* 11-12.

Ree, M. J., Earles, J. A., & Teachout, M. S. (1994). Predicting job performance; Not much more than *g*. *Journal of Applied Psychology, 79* ,518-524.

Segall, D. O. (2004). *Development and evaluation of the 1997 ASVAB score scale,* Technical Report No. 2004-002. Seaside, CA: Defense Manpower Data Center.

Welsh, J. R., Kucinkas, S. K., & Curran, L. T. (1990). Armed Services Vocational Aptitude Battery (ASVAB): Integrative review of validity studies, AFHRL-TR-90-22. Brooks AFB, TX: Manpower and Personnel Division, Air Force Research Laboratory.

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AFQT	Armed Forces Qualification Test
AFS	Air Force Specialty
AO	Assembling Objects subtest
AR	Arithmetic Reasoning subtest
AS	Auto & Shop Information subtest
ASVAB	Armed Services Vocational Aptitude Battery
EI	Electronics Information subtest
GS	General Science subtest
MAGE	Mechanical, Administrative, General, and Electronics composites
MC	Mechanical Comprehension subtest
MK	Mathematics Knowledge subtest
PC	Paragraph Comprehension subtest
WK	Word Knowledge subtest
VE	Verbal Expression composite

APPENDIX A - Range-Restriction-Corrected Correlations for each Air Force Specialty

AFS Code	AFS Title	N	MAGE Requirement	Range Restriction Corrected Correlation				
				AFQT	M	A	G	E
1A031	In-Flight Refueling	284	G 55	.555	.585	.561	.562	.582
1A131	Flight Engineer	484	G 57	.589	.562	.583	.592	.570
1A231	Aircraft Loadmaster	874	G57	.647	.606	.632	.641	.620
1A331	Airborne Mission Systems	512	E 70	.766	.702	.735	.771	.742
1A431	Airborne Battle Management Systems	317	G 55	.675	.615	.675	.655	.628
1A731	Aerial Gunner	109	M 60 or E 45	.613	.586	.608	.560	.648
1A831	Airborne Crypto-linguist	865	G 72	.454	.479	.430	.466	.464
1A832	Airborne Intel Surveillance/Reconnaissance	155	G 72	.806	.783	.746	.817	.767
1C032	Aviation Resource Management	1047	A 41	.696	.632	.690	.682	.657
1C131	Air Traffic Control	1657	M 55 & G 55	.718	.708	.702	.715	.694
1C231	Combat Control	208	G 44	.373	.324	.361	.377	.357
1C331	Command Post	634	G 49	.651	.594	.639	.627	.583
1C431	Tactical Air Command & Control	408	G 49	.669	.644	.656	.664	.650
1C531	Aerospace Control & Warning Systems	625	G 55	.728	.690	.726	.720	.719
1C631	Space Systems Operations	420	E 60	.478	.473	.486	.462	.479
1C731	Airfield Management	367	M 40 & G 50	.616	.593	.616	.595	.625
1N031	Operations Intelligence	1697	G 57	.699	.615	.695	.678	.641
1N131	Imagery Analyst	1521	G 66	.701	.695	.694	.691	.689
1N231	Signals Intelligence Analyst	278	G 53	.702	.605	.710	.666	.658
1N330	Cryptologic Linguist	107	G 72	.460	.408	.485	.416	.449
1N331	Cryptologic Linguist	618	G 72	.612	.604	.586	.608	.598
1N332	Cryptologic Linguist	88	G 72	-.695	-.539	-.688	-.626	-.682
1N333	Cryptologic Linguist	118	G 72	.673	.666	.613	.693	.591
1N334	Cryptologic Linguist	503	G 72	.552	.503	.547	.555	.542
1N335	Cryptologic Linguist	460	G 72	.486	.405	.502	.462	.447
1N431	Fusion Analyst	1048	G 62	.724	.669	.702	.715	.689

AFS Code	AFS Title	N	MAGE Requirement	Range Restriction Corrected Correlation				
				AFQT	M	A	G	E
1N531	Electronic Signals Intel Exploitation	295	G 72	.750	.683	.732	.747	.729
1P031	Aircrew Equipment	971	M 40	.647	.658	.625	.643	.663
1T131`	Aircrew Life Support	353	G 55	.657	.669	.639	.651	.625
1T231	Pararescue	207	G 44	.487	.413	.462	.492	.404
1U0x1	Sensor Operator – Basic SO Course	461	G 64 or E 54	.528	.539	.468	.499	.490
1W031	Weather	1177	G 66 & E 50	.760	.728	.736	.749	.745
2A031	Avionics Test Station & Components	722	E 70	.651	.601	.631	.629	.629
2A331	A-10, F-15, U-2 Avionics Systems – A/C	784	E 70	.714	.685	.691	.689	.704
2A332	F-16, F-17, RQ-1, CV-22, Avionics Systems	902	E 70	.722	.724	.706	.727	.732
2A333	Tactical A/C Maint: U-2, A-10, F-15, F-16, F-22	5385	M 47	.643	.663	.625	.635	.657
2A531	Aerospace Maintenance: B-52, C-18, C-135	1433	M 47	.683	.746	.661	.689	.722
2A532	Helicopter Maintenance	431	M 56	.568	.603	.548	.574	.624
2A533	Tactical Aircraft Maintenance A-10, F-15	3545	E 70	.715	.703	.705	.706	.727
2A631	Aerospace Propulsion	3471	M 56	.662	.690	.641	.658	.662
2A632	Aerospace Ground Equipment	2403	M 47 & E 28	.738	.762	.712	.739	.755
2A633	Aircrew Egress Systems	387	M 56	.570	.599	.559	.583	.614
2A634	Aircraft Fuel Systems	1385	M 47	.711	.731	.691	.709	.732
2A635	Aircraft Hydraulics Systems	1305	M 56	.704	.735	.656	.700	.705
2A636	Aircraft Electrical & Environmental Systems	2256	M 41 & E 61	.775	.785	.760	.768	.802
2A731	Aircraft Metals Technology	419	M 47	.467	.474	.462	.478	.509
2A732	Nondestructive Inspection	488	M 42	.764	.767	.752	.766	.765
2A733	Aircraft Structural Maintenance	1689	M 47	.686	.702	.670	.683	.703
2A735	Low Aircraft Observable Structural Maintenance	204	M 47	.651	.710	.606	.681	.648
2F031	Fuels	2063	M 47 & G 38	.679	.685	.650	.674	,679
2G031	Logistic Plans	343	A 56	.420	.334	.398	.394	.400

AFS Code	AFS Title	N	MAGE Requirement	Range Restriction Corrected Correlation				
				AFQT	M	A	G	E
2M031	Missile & Space Systems Electronics Maintenance	395	E 70	.767	.750	.746	.757	.742
2M032	Missile & Space Systems Maintenance	289	M 47	.659	.675	.650	.655	.674
2M033	Missile & Space Facilities	215	E 70	.619	.592	.615	.591	.592
2P031	Precision Measurement Equipment Lab	426	E 70	.818	.769	.806	.807	.818
2R031	Maintenance Management Analysis	346	G 55	.721	.628	.720	.703	.700
2R131	Maintenance Management Production	487	G 44	.621	.525	.586	.600	.573
2S031	Supply Management	3993	A 41 or G 44	.664	.596	.667	.638	.639
2T031	Traffic Management	1114	A 35	.707	.656	.704	.697	.688
2T131	Vehicle Operations	960	M 40	.673	.665	.648	.665	.637
2T231	Air Transportation	3436	M 47 & A 28	.727	.698	.717	.714	.709
2T331	Vehicle & Vehicle Equipment Maintenance	1160	M 47	.513	.574	.497	.530	.564
2T332	Special Vehicle Maintenance	343	M 40	.445	.406	.436	.439	.414
2T337	Vehicle Maintenance Control & Analysis	359	A 41	.621	.550	.616	.610	.605
2W031	Munitions Systems	3754	M 60 or G 57	.740	.720	.726	.729	.731
2W131	Aircraft Armament Systems	3668	M 60 or E 45	.707	.716	.694	.700	.724
2W231	Nuclear Weapons	396	M 60	.727	.748	.708	.716	.738
3D031	Knowledge Operations Management	1355	A 47	.586	.523	.589	.566	.535
3D032	Cyber Systems Operations	1371	G 64	.631	.594	.625	.612	.607
3D033	Cyber Surety	503	G 64	.618	.558	.616	.590	.549
3D034	Computer Systems Programming	114	G 64	.528	.455	.535	.509	.503
3D131	Client Systems	799	E 60	.636	.605	.630	.618	.608
3D132	Cyber Transport	1033	E 70	.624	.619	.607	.616	.650
3D133	RF Transmissions Systems	959	E 70	.676	.667	.664	.661	.693
3D135	Ground Radar Systems	176	E 70	.757	.667	.745	.741	.756
3D136	Airfield Systems	221	E 70	.734	.728	.705	.730	.711

3D137	Cable & Antennae Systems	213	M 55 or E 55	.741	.774	.715	.743	.754

AFS Code	AFS Title	N	MAGE Requirement	Range Restricted Corrected Correlation				
				AFQT	M	A	G	E
3E031	Electrical Systems	831	M 35 & E 35	.776	.803	.761	.775	.800
3E032	Electrical & Power Production	917	M 56 & E 40	.706	.774	.684	.712	.751
3E131	Heating, Ventilation, AC, & Refrigeration	967	M 47 or E 28	.720	.749	.694	.711	.739
3E231	Pavement & construction Equipment	1020	M 40	.655	.663	.634	.648	.639
3E331	Structural	499	M 47	.699	.692	.678	.686	.661
3E431	Water & Fuel Systems Maintenance	968	M 47 & E 28	.686	.728	.654	.697	.712
3E433	Pest Management	158	G 38	.785	.751	.759	.753	.774
3E531	Engineering	470	G 49	.529	.538	.533	.540	.557
3E631	Operations Management	327	G 44	.727	.675	.703	.706	.698
3E731	Fire Protection	2602	G 38	.757	.776	.732	.756	.741
3E831	EOD	147	M 60 & G 64	.399	.395	.409	.381	.413
3E931	Emergency Management	149	G 62	.836	.779	.810	.832	.813
3M031	Services	2810	G 24	.660	.603	.652	.635	.624
3N032[a]	Broadcast Journalist	206	G 72	.666	.721	.638	.668	.659
3P031	Security Forces	19261	G 33	.780	.743	.765	.767	.746
3S031	Personnel	2316	A 41	.589	.593	.582	.578	.554
3S231	Education & Training	266	G 59	.399	.354	.412	.370	.389
4A031	Health Services Management	1215	G 44	.762	.730	.760	.752	.736
4A131	Medical Material	527	G 44	.625	.544	.632	.604	.581
4A231	Biomedical Equipment	225	M 60 & E 70	.745	.728	.758	.724	.747
4B031	Bioenvironmental Engineering	322	G 49	.383	.390	.391	.385	.443
4C031	Mental Health Services	376	G 55	.746	.625	.764	.712	.679

4D031	Diet Therapy	177	G 44	.834	.802	.827	.826	.806
4E031[a]	Public Health	457	G 44	.495	.415	.472	.420	.439
AFS Code	AFS Title	**N**	**MAGE Requirement**	**Range Restriction Corrected Correlation**				
				AFQT	**M**	**A**	**G**	**E**
4J032	Physical Medicine	130	G 49	.667	.567	.669	.621	.637
4M031[a]	Aerospace Physiology	111	G 44	.216	.199	.316	.153	.248
4N131	Surgeon	311	G 44	.705	.668	.716	.694	.671
4P031	Pharmacy	366	G44	.649	.587	.676	.652	.600
4R031	Diagnostic Imaging	423	G 44	.688	.664	.692	.689	.667
4V031	Optometry	93	G 55	.469	.426	.502	.436	.485
4Y031	Dental Assistant	870	G 44	.764	.709	.738	.744	.728
4Y032	Dental Laboratory (apprentice level)	149	G 66	.534	.570	.517	.511	.579
6C031	Contracting	753	G 72	.767	.700	.759	.760	.717
6F031	Financial Management & Comptroller	1289	G 57	.718	.643	.708	.704	.666
9S100	Technical Applications Specialist	245	M 88 & E 85	.726	.751	.657	.762	.743

[a] The training criteria for these specialties were dichotomous pass/fail scores. Correlations for these courses were corrected for both range restriction (Lawley, 1943) and dichotomization (Cohen, 1983). All other correlations were corrected only for range restriction.